

September 13, 2018

SOP Group G
Revision 0.0

SOP Group G
Standard Operating Procedures
For Sample Preservation, Storage, Handling and Field COC Documentation

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**FIGURE 1 – EXAMPLES OF SAMPLE CONTAINERS, HOLD TIMES, &
PRESERVATIVES BY PARAMETER AND MATRIX**

APPENDIX A – EXAMPLE CHAIN-OF-CUSTODY FORMS/RECORDS

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Introduction

The purpose of this Standard Operating Procedure (SOP) is to provide general guidelines for the preservation, storage, and handling of water, soil/sediment, and vapor/air samples. Requirements for sample volume, matrix spike/matrix spike duplicate (MS/MSD) sample volume, container type, and preservation techniques for sample preservation, storage, and handling must be established in the work plan prior to sample collection.

The methods described in this SOP are typically applicable operating procedures which may be varied or changed as required, dependent upon site conditions or equipment limitations. In all instances, the procedures employed should be documented in the site logbook and associated with the final report.

Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

SOP G.1 METHOD SUMMARY

Proper techniques of preserving, storing, and handling water, soil/sediment, and vapor/air samples are critical if the integrity of the samples are to be maintained. This SOP is applicable to all water, soil/sediment, and vapor/air samples collected in Indiana.

SOP G.2 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE**SOP G.2.1 Sample Preservation and Storage**

Samples should be collected using equipment and procedures appropriate to the matrix, the parameters to be analyzed, and the sampling objective. The volume of the sample collected must be sufficient to perform the analysis requested, as well as the quality assurance/quality control requirements.

Table 1 contains examples of parameters which are typically of interest in environmental site investigations and indicates the required sample volume, the proper types of containers, and the preservation method for water and soil/sediment samples. Note that the majority of the water and soil/sediment samples must be cooled to $\leq 4^{\circ}\text{C}$ from the time of collection until analysis. Vapor and air samples do not have to be cooled after the sample has been collected into the appropriate sampling apparatus (typically a Summa canister). **Table 1** provides an example of typical sample volumes, container types, and preservation methods but these items should be verified with the laboratory before ordering and obtaining the samples.

Depending on the arrangements for sample analysis and the amount of sample required for the analysis, it is possible that aliquots for several analyses may be taken from the same

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sample container. This should be verified with the laboratory performing the analyses prior to sample collection.

All sample containers must be clean and labeled appropriately. The exterior of the sample containers must be wiped clean and dry prior to sample packaging. All samples must be packaged according to the requirements of U.S. Environmental Protection Agency (USEPA) or Indiana Department of Environmental Management (IDEM).

For more information regarding sample collection, refer to the Procedures section of the appropriate SOP. Sample containers must not be pre-rinsed with the sample prior to sample collection. When a preservative other than cooling is used or required, the proper amount of preservative should already be present in the laboratory-supplied containers. However, some analysis may require the sampler to add a predetermined preservative to the sample container after field collection. Please refer to the site-specific work plan and consult with a representative from the laboratory to ensure you have the proper preservative and know the quantity and proper way to introduce the preservative to the sample container.

The laboratory performing the analysis should be contacted to confirm the requirements for sample volumes, container types, and preservation techniques. This information should be documented in the work plan.

SOP G.2.2 Chain-of-Custody Procedures

In some instances, it may be necessary to prove any analytical data offered into evidence accurately represent environmental conditions existing at the time of sample collection. Due to the evidentiary nature of such samples, possession must be traceable from the time the samples are collected until they are introduced as evidence in legal proceedings. It must be clearly demonstrated that none of the involved samples could have been tampered with during collection, transfer, storage, or analysis.

To maintain and document sample possession, the following chain-of-custody procedures should be followed:

SOP G.2.2.1 Sample custody

A sample is under custody if: a) It is in your possession, or b) It is in your view, after being in your possession, or c) It was in your possession and then you locked it up or placed it in a sealed container to prevent tampering, or d) It is in a designated secure area.

SOP G.2.2.2 Field custody

a) Advise laboratory personnel at the time a decision is made that a sample requiring a chain-of-custody record is going to be collected. Specify the data and time that it will arrive in the laboratory. In instances where it is not known in advance of field trip, the laboratory should be notified as soon as possible about the arrival of such samplers.

b) In collecting samples for evidence, collect only that number which provides a good representation of the medium being sampled. To the extent possible, the quantity and type of samples and sample locations are determined prior to the actual field work. As few people as

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possible should handle the samples.

c) The samples must be collected in accordance with required and established methods.

SOP G.2.2.3 Transfer of custody and shipment

a) To establish the documentation necessary to trace sample possession, a Chain-of-Custody Record (examples included as **Appendix A**) must be filled out and accompany each set of samples. The record should accompany the samples to the laboratory. This record documents sample custody transfer from the sampler to the analyst at the laboratory. At a minimum, the record should contain: the sampling location or sample identification; the signature of the collector; the date and time of collection; place and address of collection; substance sample; signature of persons involved in the chain of possession; and, inclusive dates of possession.

b) Samples will be packaged properly for shipment and dispatched to the appropriate laboratory for analysis.

c) Each transfer of sample custody must be documented on the Chain-of-Custody Record via signature (with date and time) of the sample collector and who subsequently receives the samples from the sample collector.

d) All shipments will be accompanied by the Chain-of-Custody Record identifying its contents. The original record will accompany the shipment, and a copy will be retained by the project leader.

e) The laboratory should have an assigned laboratory custodian and an alternate who are responsible for overseeing the reception of all controlled custody samples. Controlled custody samples will be of the highest priority and will be analyzed before all other environmental samples.

f) In the field and in the laboratory, the number of individuals having access to these samples should be kept to a minimum to lessen the number of potential witnesses. Then the samples are not in the immediate possession of the individual having official custody, they must be kept in a locked enclosure or secured area.

SOP G.3 INTERFERENCES AND POTENTIAL PROBLEMS

The following are interferences or potential problems associated with sample preservation, storage, and handling:

- Samples should be protected from sunlight which may initiate photodegradation of sample components.
- Delaying sample preservation may cause chemical reactions to occur, altering original sample composition.
- Improper sample preservation may adversely affect analytical results.
- Inadequate sample volume may prohibit the appropriate analyses from being

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performed.

- Samples can become contaminated if they come in contact with human flesh; therefore, appropriate protective gloves (i.e., rubber, latex, or plastic) should be worn at all times during sampling collection and preservation.
- Samples can also become contaminated from equipment used to collect and preserve the sample; therefore, all sample collection and preservation equipment must be kept clean.

SOP G.4 EQUIPMENT/APPARATUS

The equipment/apparatus required to collect samples must be determined on a site-specific basis. Refer to the specific SOPs for sampling techniques, which include lists of the equipment/apparatus required for sampling.

In general, the following specific equipment/apparatus may be required for proper sample preservation:

- t-handle samplers
- plastic baggies and packaging
- safety equipment
- glass and plastic bottles (various sizes)
- Summa canisters (various sizes)
- preservatives (acids, bases, and/or ice)

SOP G.5 REAGENTS

Reagents required for preservation of samples are specified in **Table 1**. The preservatives required are specified by the analyses to be performed.

SOP G.6 PROCEDURES

Check with the analytical lab to determine which sample container and preservative are required for each analysis. When possible, utilize laboratory provided sample containers which have previously had preservative added to the appropriate sample container. Once soil and aqueous samples are collected, then immediately cool samples to $\leq 4^{\circ}\text{C}$.

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Table 1

METHOD HOLD TIME, CONTAINER AND PRESERVATION GUIDE

PASI - INDIANAPOLIS

Parameter	Matrix	Container	Preservative	Max Hold Time
2, 3, 7, 8-TCDD	Soil	4oz Glass Jar		90/40 Days
2, 3, 7, 8-TCDD	Water			90/40 Days
Acidity	Water			14 Days
Alkalinity	Water			14 Days
Alpha Emitting Radium Isotopes	Water		HNO ₃	180 days
Anions by IC, including Br, Cl, F, NO ₂ , NO ₃ , SO ₄	Water			Br, Cl, F, SO ₄ (28 Days) NO ₂ , NO ₃ (48 Hours)
Aromatic and Halogenated Volatiles	Soil	5035 vial kit or 4oz jar		14 days
Aromatic and Halogenated Volatiles	Water		HCl, Na ₂ S ₂ O ₃	14 Days
Bacteria, Total Plate Count	Water		Na ₂ S ₂ O ₃	24 Hours
Base/Neutrals and Acids	Soil	4oz Glass Jar		14/40 Days
Base/Neutrals and Acids	Water		HCl, Na ₂ S ₂ O ₃	7/40 Days
Base/Neutrals, Acids & Pesticides	Water		HCl, Na ₂ S ₂ O ₃	7/30 Days
BOD/CBOD	Water			48 hours
BTEX/Total Hydrocarbons	Air	Summa Canister		14 Days
BTEX/Total Hydrocarbons	Air	Tedlar Bag		48 Hours
Chloride	Water			28 Days
Chlorinated Herbicides	Soil	4oz Glass Jar		14/40 Days
Chlorinated Herbicides	Water		HCl, Na ₂ S ₂ O ₃	14/28 Days
Chlorine, Residual	Water			Analyze within 15 minutes
COD	Water		H ₂ SO ₄	28 Days
Color	Water			48 Hours
Condensable Particulate Emissions	Air	Solutions		6 Months
Cyanide, Reactive	Water			28 Days
Cyanide, Total and Amenable	Water		NaOH	14 Days, 24 Hours if Sulfide present
Diesel Range Organics	Soil	4oz Glass Jar		14/40 Days
Diesel Range Organics	Water			7/40 Days
Dioxins & Furans	Air	PUF		30/45 Days
EDB & DBCP	Water		HCl, Na ₂ S ₂ O ₃	14 Days
Explosives	Water			7/40 Days
Explosives	Soil	4oz Glass Jar		14/40 Days
Ferrous Iron	Water			Immediate
Flashpoint/Ignitability	Water			28 Days
Fluoride	Water			28 Days
Gamma Emitting Radionuclides	Water		HNO ₃	180 days
Gas Range Organics	Water		HCl	14 Days
Gasoline Range Organics	Soil	5035 vial kit or 4oz jar		14 days
Gross Alpha (NJ 48Hr Method)	Water		HNO ₃	48 Hrs
Gross Alpha and Gross Beta	Water		HNO ₃	180 days
Halooacetic Acids	Water		NH ₄ Cl	14/7 Days
Hardness, Total (CaCO ₃)	Water		HNO ₃	6 Months
Hexavalent Chromium	Water		50% NaOH	24 Hours
Hydrogen Halide & Halogen Emissions	Air	Solutions		6 Months
Lead Emissions	Air	Filter/Solutions		6 Months
Low Level Mercury	Water		BrCl	90 days (if preserved and oxidized)
Mercury	Soil	4oz Glass Jar		28 days
Mercury	Water		HNO ₃	28 Days
Metals	Air	Filters		6 Months
Metals	Soil	4oz Glass Jar		6 months
Metals (and other ICP elements)	Water		HNO ₃	6 Months
Methane, Ethane, & Ethene	Water		HCl	14 Days
Methane, Ethane, Ethene	Air	Summa Canister		14 Days
Methane, Ethane, Ethene	Air	Tedlar Bag		48 Hours
Nitrogen, Ammonia	Water		H ₂ SO ₄	28 Days

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Table 1 (continued)

Parameter	Matrix	Container	Preservative	Max Hold Time
Nitrogen, Kjeldahl	Water		H ₂ SO ₄	28 Days
Nitrogen, Nitrate	Water			48 Hours
Nitrogen, Nitrate & Nitrite	Water		H ₂ SO ₄	28 Days
Nitrogen, Nitrite	Water			48 Hours
Nitrogen, Organic	Water		H ₂ SO ₄	28 Days
Non-Methane Organics	Air	Summa Canister		14 Days
Non-Methane Organics	Air	Tedlar Bag		48 Hours
Odor	Water			24 Hours
Oil and Grease/HEM	Water		H ₂ SO ₄	28 Days
Organochlorine Pesticides and PCB's	Water		HCl, Na ₂ S ₂ O ₃	7/40 Days
Organochlorine Pesticides & PCBs	Air	PUF		7/40 Days
Organochlorine Pesticides and PCB's	Water		HCl, Na ₂ S ₂ O ₃	7/40 Days
Organochlorine Pesticides and PCBs	Soil	4oz Glass Jar		14/40 Days
Organophosphorous Pesticides	Soil	4oz Glass Jar		14/40 Days
Organophosphorous Pesticides	Water		HCl, Na ₂ S ₂ O ₃	7/40 Days
Oxygen, Dissolved (Probe)	Water			Analyze within 15 minutes
Paint Filter Liquid Test	Water			N/A
Particulates	Air	Filters		6 Months
Permanent Gases	Air	Summa Canister		14 Days
Permanent Gases	Air	Tedlar Bag		48 Hours
pH	Water			Analyze within 15 minutes
Phenol, Total	Water		H ₂ SO ₄	28 Days
Phosphorus, Orthophosphate	Water			Filter within 15 minutes, Analyze within 48 Hours
Phosphorus, Total	Water		H ₂ SO ₄	28 Days
Polynuclear Aromatic Hydrocarbons	Air	PUF		7/40 Days
Polynuclear Aromatic Hydrocarbons	Soil	4oz Glass Jar		14/40 Days
Polynuclear Aromatic Hydrocarbons	Water		HCl, Na ₂ S ₂ O ₃	7/40 Days
Radioactive Strontium	Water		HNO ₃	180 days
Radium-226 Radon Emanation Technique	Water		HNO ₃	180 days
Radium-228	Water		HNO ₃	180 days
Silica, Dissolved	Water			28 Days
Solids, Settleable	Water			48 Hours
Solids, Total	Water			7 Days
Solids, Total Dissolved	Water			7 Days
Solids, Total Suspended	Water			7 Days
Solids, Total Volatile	Water			7 Days
Specific Conductance	Water			28 Days
Stationary Source Dioxins & Furans	Air	XAD Trap		30/45 Days
Stationary Source Mercury	Air	Filters		6 Months, 28 Days for Hg
Stationary Source Metals	Air	Filters		6 Months, 28 Days for Hg
Stationary Source PM10	Air	Filters		6 Months
Stationary Source Particulates	Air	Filter/Solutions		6 Months
Sulfate	Water			28 Days
Sulfide, Reactive	Water			28 Days
Sulfide, Total	Water		NaOH, ZnOAc	7 Days
Sulfite	Water			Analyze within 15 minutes
Surfactants	Water			48 Hours
Total Organic Carbon (TOC)	Water		H ₂ SO ₄ or HCl	28 Days
Total Organic Halogen (TOX)	Water			14 Days
Tritium	Water		HNO ₃	180 days
Turbidity	Water			48 Hours
Uranium Radiochemical Method	Water		HNO ₃	180 days
Volatiles	Air	Summa Canister		14 Days
Volatiles	Air	Tedlar Bag		48 Hours
Volatiles	Air	Summa Canister		14 Days
Volatiles	Air	Tedlar Bag		48 Hours
Volatiles	Air	Summa Canister		14 Days
Volatiles	Soil	5035 vial kit or 4oz jar		14 days
Volatiles	Water		HCl	14 Days
Volatiles	Water		HCl	14 Days (7 unpreserved)

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APPENDIX A

EXAMPLE CHAIN-OF-CUSTODY FORMS/RECORDS

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A		Section B		Section C		Page: of	
Required Client Information:		Required Project Information:		Invoice Information:			
Company:		Report To:		Attention:			
Address:		Copy To:		Company Name:		REGULATORY AGENCY	
				Address:		<input type="checkbox"/> NPDES <input type="checkbox"/> GROUND WATER <input type="checkbox"/> DRINKING WATER	
Email To:		Purchase Order No.:		Pace Quote Reference:		<input type="checkbox"/> UST <input type="checkbox"/> RCRA <input type="checkbox"/> OTHER _____	
Phone:	Fax:	Project Name:		Pace Project Manager:		Site Location	
Requested Due Date/TAT:		Project Number:		Pace Profile #:		STATE:	

[illegible]



AIR: CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A
Required Client Information:

Company:
Address:
Email To:
Phone: Fax:
Requested Due Date/TAT:

Section B
Required Project Information:

Report To:
Copy To:
Purchase Order No.:
Project Name:
Project Number:

Section C
Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager/Sales Rep.
Pace Profile #:

Page: of

Program
☐ UST ☐ Superfund ☐ Emissions ☐ Clean Air Act
☐ Voluntary Clean Up ☐ Dry Clean ☐ RCRA ☐ Other
Reporting Units
ug/m³ mg/m³
PPBV PPMV
Other
Report Level II. III. IV. Other

ITEM #	'Section D Required Client Information AIR SAMPLE ID Sample IDs MUST BE UNIQUE	Valid Media Codes		MEDIA CODE	PID Reading (Client only)	COLLECTED				Initial Field reading (inches of Hg)	Final Field reading (inches of Hg)	Summa Can Number	Flow Control Number	Method:															Pace Lab ID																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
		MEDIA	CODE			COMPOSITE START		COMPOSITE - END/GRAB						PM10	3C- Fixed Gas (%)	TO3	TO3M (Methane)	TO4 (PCBs)	TO13 (PAH)	TO14	TO15	TO15 Short List*																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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Comments :

RELINQUISHED BY / AFFILIATION

DATE

TIME

ACCEPTED BY / AFFILIATION

DATE

TIME

SAMPLE CONDITIONS

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER:

DATE Signed (MM / DD / YY)

Temp in °C

Received on Ice

Custody Sealed Cooler

Samples Intact